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Claim 43. (Amended) An oscillating transmission having an output gear, said output gear being mounted for rotation in either direction, a gear cage having a first drive gear and a second drive gear for alternately driving said output gear to oscillate said output gear between a first and second angular position, means mounting said gear cage for movement between a first and second drivingly engaged position, toggle means for alternately moving said gear cage in one direction to said first drivingly engaged position to drivingly engage said first drive gear with said output gear to drive said output gear in a direction to its second angular position and in the other direction to said second drivingly engaged position to drivingly engage said second drive gear with said output gear to drive said output gear in a direction to its first angular position, [said means for alternately moving said gear cage including] first biasing means for alternately biasing said toggle means and gear cage in one direction to the other toward [to] its first or second drivingly engaged position, [said] means for [alternately moving said gear cage] removing the bias of said first biasing means from said gear cage during the movement of said output gear to its first or second angular position, and second biasing means for directly biasing said gear cage in said one direction towards its first drivingly engaged position to maintain the gear cage biased in said one direction when the bias of said first biasing means [for biasing] has been removed to move said gear cage in said other direction at least until said first biasing means is biasing said gear cage in said other direction.

Claim 63, last line, after "positions", insert --until engagement--.

Claim 69, last line, after "positions", insert --until engagement--.

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Cancel claim 75, because the amendment herein to claim 63 makes claim 75 a duplicate of claim 63.

Please add new claims 102 - 174.

CLAIM 402. An oscillating sprinkler unit, comprising:

- a sprinkler head mounted for rotation about a first axis;
- a drive motor;

a reversible gear train for drivingly connecting said drive motor for driving said sprinkler head in alternate directions, comprising drive gear means connected to said sprinkler head, shiftable drive means comprising alternately operable terminal gear means and carrier means for carrying said terminal gear means, said shiftable drive means being shiftable to alternately engageable positions of said alternatively operable terminal gear means with said drive gear means for driving said sprinkler head in alternate directions;

shifting arm means pivotally mounted adjacent said carrier means and movable between alternate shifting positions by engagement with contact means carried by said drive gear means, and lost motion means for connecting said shifting arm means with said carrier means for shifting said carrier means between said alternately engageable positions upon movement of said shifting arm means between said alternate shifting positions;

first over-center biasing means for maintaining said carrier means in a selected one of said alternately engageable positions until positively shifted therefrom by said shifting arm means; and

second over-center biasing means for maintaining said shifting arm means in a selected one of alternate shifting positions until engagement by said contact means.

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CLAIM 103. The sprinkler of claim 102 wherein:

said shiftable drive means comprises a drive gear driven by said drive motor and mounted for rotation about a second axis spaced from said first axis;

said carrier means is mounted for pivotal movement about said second axis; and

said shifting arm means is mounted for pivotal movement about said first axis.

CLAIM-104. The sprinkler unit of claim 103 wherein:

said carrier means comprises a yoke surrounding said first axis, and said lost motion means comprises contact means on the opposite side of said first axis from said second axis for alternate engagement with said shifting arm means.

CLAIM-105. The sprinkler unit of claim-104 wherein:

said first over-center means comprises a spring engaging said yoke.

CLAIM-106. The sprinkler of claim-105 wherein:

said spring comprises a generally U-shaped leaf spring.

CLAIM-107. The sprinkler system of claim 103 wherein:

said first over-center means maintains said terminal gear means in one of said alternatively operable positions of engagement until said yoke is biased by said second over-center means through said shifting arm means.

CLAIM 108. An oscillating sprinkler unit, comprising:

- a sprinkler head mounted for rotation about a first axis;
- a drive motor;

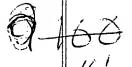
a reversible gear train for drivingly connecting said drive motor for driving said sprinkler head in alternate directions, comprising a drive gear connected to said sprinkler head, shiftable drive means comprising alternately operable terminal gear means and carrier means for carrying said terminal gear means, said shiftable drive means being shiftable to alternately engageable positions of said alternatively operable terminal gear means with said drive gear for driving said sprinkler head in alternate directions;

shifting arm means pivotally mounted adjacent said carrier means and movable between alternate shifting positions by engagement with contact means carried by said final drive gear means, and lost motion means for providing engagement with said carrier means for shifting said carrier means between said alternately engageable positions upon movement of said shifting arm means between said alternate shifting positions;

first over-center biasing means for maintaining said carrier means in a selected one of said alternately engageable positions until positively shifted therefrom by said shifting arm means; and

second over-center biasing means for maintaining said shifting arm means in a selected one of alternate shifting positions until engagement by said contact means.





CLAIM 109. The sprinkler of claim 108 wherein:

said shiftable drive means includes a drive gear driven by said drive motor and mounted for rotation about a second axis spaced from said first axis;

said carrier means is mounted for pivotal movement about said second axis;

said shifting arm means is mounted for pivotal movement about said first axis.

CLAIM-Ho. The sprinkler unit of claim-109 wherein:

said carrier means comprises a yoke surrounding said first axis and said lost motion means comprises contact means on the opposite side of said first axis from said second axis;

said over-center means comprises spring means engaging said yoke; and said spring means comprises a generally U-shaped leaf spring.

CLAIM 14. The sprinkler system of claim wherein:

said first over-center means maintains said terminal gear means in engagement until said yoke is biased by said second over-center means through said shifting arm means.

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CLAIM-112. An oscillating sprinkler unit, comprising: a sprinkler head mounted for rotation about a first axis; rotating drive means for driving said sprinkler head in alternate directions; drive means including a shiftable carrier for effecting alternately engageable driving positions with said rotating drive means; arc control contact means; shift means pivotally movable by said arc control contact means for initiating movement of said carrier from one of said alternately engageable driving positions toward the other; first biasing means for biasing said shift means and said shiftable carrier means toward one or the other of said driving positions; and second biasing means for biasing said shiftable carrier into driving engagement with at least one of said alternately engageable driving positions independent of said first biasing means.

/0/ /00 CLAIM +113. An oscillating sprinkler unit as in claim -112 wherein:

said second biasing means urges said shiftable carrier into one or the other of said alternately engageable driving positions with said rotating drive means until shifted therefrom by said shift means in response to engagement of said shift means by said are control contact means.

/00 CLAIM 114. An oscillating sprinkler unit as in claim-112 wherein:

each of said first and second biasing means includes over-center spring means.

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CLAIM+15. An oscillating sprinkler unit as in claim+112 wherein:

one of said first and second biasing means includes spring means for imposing a load on said shiftable carrier, and the other of said biasing means includes spring means for imposing a load on said shift means.

CLAIM 116. An oscillating transmission having an output gear, a gear cage with two drive gears, a first drive gear and a second drive gear for alternate driving engagement with said output gear to oscillate it, means mounting said gear cage for movement, toggle means for alternately moving said gear cage in one direction to drivingly engage said first drive gear with said output gear or in the other direction to drivingly engage said second drive gear with said output gear, first biasing means connected to said toggle means to impose a biasing load on said toggle means and said gear cage in one direction or the other direction and second biasing means connected to said gear cage to impose a biasing load on said gear cage in one direction or the other direction and second biasing means

direction

CLAIM-117. An oscillating sprinkler unit as in claim 116 wherein:

each of said first and second biasing means includes over-center spring means.

CLAIM-118. An oscillating sprinkler unit as in claim 116 wherein:

one of said first and second biasing means includes spring means for imposing a load on said shiftable carrier, and the other of said biasing means includes spring means for imposing a load on said shift means.

CLAIM-119. A rotary drive sprinkler device comprising:

a housing for receiving a supply of water;

nozzle head means for directing the flow of water from the sprinkler device, said nozzle head means having a top;

rotatable output shaft means in said housing, said output shaft means being drivingly connected to said nozzle head means;

a drive assembly in said housing for driving said output shaft means;

reversing means within said housing for reversing the direction of rotation of said output shaft means to oscillate said nozzle head means;

actuation means connected to said reversing means for operating said reversing means;

first and second angular limit contact means within said housing for defining a desired angle of oscillation of said nozzle head means, at least one of said contact means being adjustable with respect to the other to set a desired angle of oscillation of said nozzle head means;

said actuation means being responsive to contact with each of said first and second said angular limit contact means to actuate said reversing means to reverse the direction of rotation of said output shaft means;

setting means at the top of said nozzle head means connected to at least one of said angular limit contact means within said housing for changing the relative angular position between said first and second angular limit contact means to increase or decrease the angle of oscillation; and

indicator means at the top of said nozzle head means for providing a visual representation of a change in angle of oscillation.

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(07) CLAIM 129. A rotary drive sprinkler device as in claim 119 including:

indicating means on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

CLAIM-121. A rotary drive sprinkler device as in claim-119 wherein: said nozzle means has a top surface; and said setting means is located in the center of the top surface.

//O /O /O /CLAIM 122. A rotary drive sprinkler device as in claim 119 wherein:

said setting means is directly accessible and actuated from the exterior of said nozzle means.

CLAIM 123. A rotary drive sprinkler device as in claim 119, wherein: said nozzle means has a top surface; and

said setting means and said indicator means are located in the center of said top surface.

CLAIM 124. A rotary drive sprinkler device as in claim 123 wherein: said setting means forms part of said indicating means.

CLAIM-125. A rotary drive sprinkler device as in claim 119 wherein:

said setting means on the top of said nozzle head means is rotatable; and the degree of rotation of said setting means is equal to the degree of change in angular position between said first and second angular limit contact means.

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CLAIM 126. A rotary drive sprinkler device as in claim-119 including:

indicator means on the top of nozzle head means for indicating the position of a nozzle in said nozzle head means.

CLAIM-127. A rotary drive sprinkler device comprising:

a housing for receiving a supply of water;

nozzle head means for directing the flow of water from the sprinkler device, said nozzle head means having a top;

rotatable output shaft means in said housing, said output shaft means being drivingly connected to said nozzle head means;

a drive assembly in said housing for driving said output shaft means;

reversing means within said housing for reversing the direction of rotation of said output shaft means to oscillate said nozzle head means;

actuation means connected to said reversing means for operating said reversing means;

first and second angular limit contact means within said housing for defining a desired angle of oscillation of said nozzle head means, at least one of said contact means being adjustable with respect to the other to set a desired angle of oscillation of said nozzle head means;

said actuating means being responsive to contact with each of said first and second said angular limit contact means to actuate said reversing means to reverse the direction of rotation of said output shaft means;

rotatable setting means in said nozzle head means connected to at least one of said angular limit contact means within said housing for changing the relative angular position between said first and second angular limit contact means to increase or decrease the angle of oscillation by an amount substantially equal to the rotation of said setting means; and

said nozzle head means having a top surface and said setting means being at the center of said top surface and being accessible from the exterior of said nozzle.

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CLAIM-128. A rotary drive sprinkler device as in claim 127, including:

indicator means on said top surface having indicia representative of changes in the angle of oscillation of said nozzle head means;

said setting means cooperating with said indicia to provide a visual representation of a change in angle of oscillation.

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CLAIM-129. A rotary drive sprinkler device as in claim-127 wherein said indicator means includes:

indicia on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

CLAIM 130. A rotary drive sprinkler device as in claim 129 wherein:

said setting means includes a slot which cooperates with said indicia to provide a visual representation of a change in angle of oscillation.

CLAIM-131. A rotary drive sprinkler device as in claim 130 wherein:

said setting means is directly accessible and actuated from the exterior of said nozzle means.

CLAIM 132. A rotary drive sprinkler device as in claim 131 wherein: said setting means forms part of said indicator means.

CLAIM 133. A rotary drive sprinkler device as in claim 129 wherein:

said setting means includes a slot which cooperates with said indicia to provide a visual representation of a change in angle of oscillation.

/22 CLAIM 134. A rotary drive sprinkler device as in claim 127 wherein:

said setting means on the top of said nozzle head means is rotatable; and the degree of rotation of said setting means is equal to the degree of change in angular position between said first and second angular limit contact means.

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CLAIM-135. A rotary drive sprinkler device as in claim 127 including:

indicator means on the top of nozzle head means for indicating the position of a nozzle in said nozzle head means.

124 CLAIM 136. A rotary drive sprinkler device comprising:

a housing for receiving a supply of water;

nozzle head means for directing the flow of water from the sprinkler device, said nozzle head means having a top;

rotatable output shaft means in said housing, said output shaft means being drivingly connected to said nozzle head means;

a drive assembly in said housing for driving said output shaft means;

reversing means within said housing for reversing the direction of rotation of said output shaft means to oscillate said nozzle head means;

actuation means connected to said reversing means for operating said reversing means;

first and second angular limit contact means within said housing for defining a desired angle of oscillation of said nozzle head means, at least one of said contact means being adjustable with respect to the other to set a desired angle of oscillation of said nozzle head means;

said actuation means being responsive to contact with each of said first and second said angular limit contact means to actuate said reversing means to reverse the direction of rotation of said output shaft means;

setting means at the top and center of said nozzle head means connected to at least one of said angular limit contact means within said housing for changing the relative angular position between said first and second angular limit contact means to increase or decrease the angle of oscillation; and

indicator means at the top of said nozzle head means for providing a visual representation of the angle of oscillation which has been set.

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(25) CLAIM +37. A rotary drive sprinkler device as in claim +36 including:

indicating means on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

CLAIM-138. A rotary drive sprinkler device as in claim 136 wherein: said nozzle means has a top surface; and

said setting means is located in the center of the top surface.

(27) CLAIM-139. A rotary drive sprinkler device as in claim 136 wherein:

said setting means is accessible and actuated from the exterior of said nozzle means.

CLAIM 140. A rotary drive sprinkler device as in claim 136 wherein:

said setting means on the top of said nozzle head means is rotatable; and the degree of rotation of said setting means is equal to the degree of change in angular position between said first and second angular limit contact means.

CLAIM 141. A rotary drive sprinkler device as in claim 136 including:

indicator means on the top of nozzle head means for indicating the position of a nozzle in said nozzle head means.

130 CLAIM 142. A rotary drive sprinkler device as in claim 136 wherein:

said setting means forms part of said indicating means.

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CLAIM-143. A rotary drive sprinkler device as in claim 136 wherein said indicator means includes:

indicia on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

CLAIM 144. A rotary drive sprinkler device as in claim 143 wherein:

said setting means includes a slot which cooperates with said indicia to provide a visual representation of a change in angle of oscillation.

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CLAIM 145. A rotary drive sprinkler device comprising:

a housing for receiving a supply of water;

nozzle head means for directing the flow of water from the sprinkler device, said nozzle head means having a top;

rotatable output shaft means in said housing, said output shaft means being drivingly connected to said nozzle head means;

a drive assembly in said housing for driving said output shaft means;

reversing means within said housing for reversing the direction of rotation of said output shaft means to oscillate said nozzle head means;

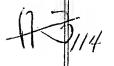
actuation means connected to said reversing means for operating said reversing means;

first and second angular limit contact means for defining a desired angle of oscillation of said nozzle head means, at least one of said contact means being adjustable with respect to the other to set a desired angle of oscillation of said nozzle head means;

said actuation means being responsive to contact with each of said first and second said angular limit contact means to actuate said reversing means to reverse the direction of rotation of said output shaft means;

setting means at the top of said nozzle head means for changing the relative angular position between said first and second angular limit contact means to increase or decrease the angle of oscillation, said setting means being above said angular limit contact means and being connected to at least one of said angular limit contact means; and

indicator means at the top of said nozzle head means for providing a visual representation of a change in angle of oscillation.



(3) CLAIM-146. A rotary drive sprinkler device as in claim 145 including:

indicating means on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

CLAIM 147. A rotary drive sprinkler device as in claim 145 wherein:

said nozzle means has a top surface; and

said setting means is located in the center of the top surface.

136 CLAIM-148. A rotary drive sprinkler device as in claim 145 wherein:

said setting means is directly accessible and actuated from the exterior of said nozzle means.

CLAIM-149. A rotary drive sprinkler device as in claim-145, wherein:

said nozzle means has a top surface; and

said setting means and said indicator means are located in the center of said top surface.

137 CLAIM-150. A rotary drive sprinkler device as in claim 149 wherein:

said setting means forms part of said indicating means.

(37) CLAIM-151. A rotary drive sprinkler device as in claim 145 wherein:

said setting means on the top of said nozzle head means is rotatable; and the degree of rotation of said setting means is equal to the degree of change in angular position between said first and second angular limit contact means.

CLAIM-152. A rotary drive sprinkler device as in claim 145 including:

indicator means on the top of nozzle head means for indicating the position of a nozzle in said nozzle head means.

(4/ CLAIM-153. A rotary drive sprinkler device comprising:

a housing for receiving a supply of water;

nozzle head means for directing the flow of water from the sprinkler device, said nozzle head means having a top;

rotatable output shaft means in said housing, said output shaft means being drivingly connected to said nozzle head means;

a drive assembly in said housing for driving said output shaft means;

reversing means within said housing for reversing the direction of rotation of said output shaft means to oscillate said nozzle head means;

actuation means connected to said reversing means for operating said reversing means;

first and second angular limit contact means for defining a desired angle of oscillation of said nozzle head means, at least one of said contact means being adjustable with respect to the other to set a desired angle of oscillation of said nozzle head means;

said actuating means being responsive to contact with each of said first and second said angular limit contact means to actuate said reversing means to reverse the direction of rotation of said output shaft means;

rotatable setting means in said nozzle head means for changing the relative angular position between said first and second angular limit contact means to increase or decrease the angle of oscillation by an amount substantially equal to the rotation of said setting means, said rotatable setting means being above said angular limit contact means and being connected to at least one of said angular limit contact means; and

said nozzle head means having a top surface and said setting means being at the center of said top surface and being accessible from the exterior of said nozzle.

CLAIM 154. A rotary drive sprinkler device as in claim 153, including:

indicator means on said top surface having indicia representative of changes in the angle of oscillation of said nozzle head means;

said setting means cooperating with said indicia to provide a visual representation of a change in angle of oscillation.

CLAIM 155. A rotary drive sprinkler device as in claim 153 wherein said indicator means includes:

indicia on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

CLAIM-156. A rotary drive sprinkler device as in claim-155 wherein:

said setting means includes a slot which cooperates with said indicia to provide a visual representation of a change in angle of oscillation.

CLAIM 157. A rotary drive sprinkler device as in claim 156 wherein:

said setting means is directly accessible and actuated from the exterior of said nozzle means.

CLAIM 158. A rotary drive sprinkler device as in claim-157 wherein: said setting means forms part of said indicator means.

(47 CLAIM 159. A rotary drive sprinkler device as in claim 155 wherein:

said setting means includes a slot which cooperates with said indicia to provide a visual representation of a change in angle of oscillation.

CLAIM 160. A rotary drive sprinkler device as in claim 153 wherein:

said setting means on the top of said nozzle head means is rotatable; and the degree of rotation of said setting means is equal to the degree of change in angular position between said first and second angular limit contact means.

CLAIM-161. A rotary drive sprinkler device as in claim 153 including:

indicator means on the top of nozzle head means for indicating the position of a nozzle in said nozzle head means.



CLAIM 462. A rotary drive sprinkler device comprising:

a housing for receiving a supply of water;

nozzle head means for directing the flow of water from the sprinkler device, said nozzle head means having a top;

rotatable output shaft means in said housing, said output shaft means being drivingly connected to said nozzle head means;

a drive assembly in said housing for driving said output shaft means;

reversing means within said housing for reversing the direction of rotation of said output shaft means to oscillate said nozzle head means;

actuation means connected to said reversing means for operating said reversing means;

first and second angular limit contact means for defining a desired angle of oscillation of said nozzle head means, at least one of said contact means being adjustable with respect to the other to set a desired angle of oscillation of said nozzle head means;

said actuation means being responsive to contact with each of said first and second said angular limit contact means to actuate said reversing means to reverse the direction of rotation of said output shaft means;

setting means at the top and center of said nozzle head means for changing the relative angular position between said first and second angular limit contact means to increase or decrease the angle of oscillation, said setting means being above said angular limit contact means and being connected to at least one of said angular limit contact means; and

indicator means at the top of said nozzle head means for providing a visual representation of the angle of oscillation which has been set.

CLAIM 163. A rotary drive sprinkler device as in claim 162 including:

indicating means on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

CLAIM 164. A rotary drive sprinkler device as in claim 162 wherein: said nozzle means has a top surface; and said setting means is located in the center of the top surface.

CLAIM 165. A rotary drive sprinkler device as in claim 162 wherein:

said setting means is accessible and actuated from the exterior of said nozzle means.

CLAIM-165. A rotary drive sprinkler device as in claim-162 wherein:

said setting means on the top of said nozzle head means is rotatable; and the degree of rotation of said setting means is equal to the degree of change in angular position between said first and second angular limit contact means.

CLAIM 167. A rotary drive sprinkler device as in claim-162 including:

indicator means on the top of nozzle head means for indicating the position of a nozzle in said nozzle head means.

CLAIM 168. A rotary drive sprinkler device as in claim 162 wherein: said setting means forms part of said indicating means.

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CLAIM 469. A rotary drive sprinkler device as in claim, 162 wherein said indicator means includes:

indicia on the exterior of said nozzle means for indicating the direction the setting means should be moved to increase or decrease the angle of oscillation.

(5) CLAIM 170. A rotary drive sprinkler device as in claim 169 wherein:

said setting means includes a slot which cooperates with said indicia to provide a visual representation of a change in angle of oscillation.

CLAIM-171. An oscillating sprinkler unit, comprising: a sprinkler head mounted for rotation about a first axis; drive means including a shiftable carrier for alternately engageable driving positions with rotating drive means for driving said sprinkler head in alternate directions; shifting arm means pivotally movable by arc control contact means for shifting said carrier towards one or the other of said alternately engageable driving positions; and biasing means for placing said shiftable carrier in driving engagement and for retaining said shiftable carrier in a selected one of said alternately engageable driving positions until shifted therefrom by said shifting arm means.

CLAIM-172. An oscillating sprinkler unit as in claim-171 wherein:

said biasing means retains said shiftable carrier in one or the other of said alternately engageable driving positions with said rotating drive means until shifted therefrom by said shifting arm means in response to engagement of said shifting arm means by said arc control contact means.